


**Utah Division of Water Quality  
Statement of Basis  
ADDENDUM  
Wasteload Analysis and Antidegradation Level I Review**

**Date:** March 1, 2016

**Prepared by:** Dave Wham   
Standards and Technical Services Section

**Facility:** Genwal Resources, Inc. – Crandall Canyon Mine  
UPDES No. UT0024368

**Receiving water:** Crandall Canyon Creek (1C, 2B, 3A, 4)

This addendum summarizes the wasteload analysis that was performed to determine water quality based effluent limits (WQBEL) for this discharge. Wasteload analyses are performed to determine point source effluent limitations necessary to maintain designated beneficial uses by evaluating projected effects of discharge concentrations on in-stream water quality. The wasteload analysis also takes into account downstream designated uses (UAC R317-2-8). Projected concentrations are compared to numeric water quality standards to determine acceptability. The numeric criteria in this wasteload analysis may be modified by narrative criteria and other conditions determined by staff of the Division of Water Quality.

Discharge

Outfall 001: Sediment Pond Discharge  
Outfall 002: Mine Water Discharge

Combined design flow is 1.5 MGD.

Receiving Water

The receiving water for both discharges is Crandall Creek, a tributary of Huntington Creek.

Per UAC R317-2-13.2(b), Huntington Creek and tributaries, from Highway U-10 crossing to headwaters is 1C, 2B, 3A, 4.

- *Class 1C - Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water.*
- *Class 2B - Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing.*

- *Class 3A - Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.*
- *Class 4 - Protected for agricultural uses including irrigation of crops and stock watering.*

Typically, the critical flow for the wasteload analysis is considered the lowest stream flow for seven consecutive days with a ten year return frequency (7Q10). Due to a lack of flow records for Crandall Creek, the 20<sup>th</sup> percentile of flow measurements was calculated on an annual basis. The source of flow data was DOGM sampling site UPF-1, Crandall Canyon upper flume (2004-2015).

Table 1: Annual critical low flow (cfs)

Season	Crandall Canyon upper flume
Annual	.33

Crandall Creek water quality was characterized based on samples collected from DOGM sampling site UPF-1 (2004-2015).

#### TMDL

Crandall Creek is a tributary to Huntington Creek. Huntington Creek and tributaries from the USFS boundary to headwaters is listed as impaired on the 2014 303(d) list for dissolved oxygen, pH, and temperature (3A aquatic life use). No TMDLs have been completed at this time. The listing was based on exceedances in tributaries to Huntington Creek (Bear Canyon and Deer Creek) which are downstream from Crandall Creek. Review of data from DOGM Site Crandall Canyon lower flume (below the discharge) shows all uses to be fully supporting.

#### Mixing Zone

The maximum allowable mixing zone is 15 minutes of travel time for acute conditions, not to exceed 50% of stream width, and 2,500 feet for chronic conditions, per UAC R317-2-5. Water quality standards must be met at the end of the mixing zone.

For Outfall 001 and 002, the effluent was consider to be totally mixed as the ratio of river flow (7Q10) to discharge flow was .14 ( $\leq 2$ ). Acute limits were calculated using 50% of the seasonal critical low flow.

#### Parameters of Concern

The potential parameters of concern identified for the discharge/receiving water were iron, TDS and aluminum ass determined in consultation with the UPDES Permit Writer.

#### WET Limits

The percent of effluent in the receiving water in a fully mixed condition, and acute and chronic dilution in a not fully mixed condition are calculated in the WLA in order to generate WET limits. The LC<sub>50</sub> (lethal concentration, 50%) percent effluent for acute toxicity and the IC<sub>25</sub> (inhibition concentration, 25%) percent effluent for chronic toxicity, as determined by the WET

test, needs to be below the WET limits, as determined by the WLA. The WET limit for LC<sub>50</sub> is typically 100% effluent and does not need to be determined by the WLA.

**Table 2: WET Limits for IC<sub>25</sub> (Outfall 001 and 002)**

Outfall	Percent Effluent
Outfall 001, 002	87.5%

#### Wasteload Allocation Methods

Effluent limits were determined for conservative constituents using a simple mass balance mixing analysis (UDWQ 2012). The mass balance analysis is summarized in Appendix A.

The water quality standard for chronic ammonia toxicity is dependent on temperature and pH, and the water quality standard for acute ammonia toxicity is dependent on pH. The AMMTOX Model developed by University of Colorado and adapted by Utah DWQ and EPA Region VIII was used to determine ammonia effluent limits (Lewis et al. 2002).

Models and supporting documentation are available for review upon request.

#### Antidegradation Level I Review

The objective of the Level I ADR is to ensure the protection of existing uses, defined as the beneficial uses attained in the receiving water on or after November 28, 1975. No evidence is known that the existing uses deviate from the designated beneficial uses for the receiving water. Therefore, the beneficial uses will be protected if the discharge remains below the WQBELs presented in this wasteload.

A Level II Antidegradation Review (ADR) is required for this facility because the receiving water is classified as a 1C drinking water source.

#### Documents:

WLA Document: *Genwal\_WLA\_2-24-16.docx*  
Wasteload Analysis: *AltonCoal\_WLA\_2-25-16.xlsm*

#### References:

Utah Division of Water Quality. 2012. *Utah Wasteload Analysis Procedures Version 1.0*.  
Lewis, B., J. Saunders, and M. Murphy. 2002. *Ammonia Toxicity Model (AMMTOX, Version2): A Tool for Determining Effluent Ammonia Limits*. University of Colorado, Center for Limnology.

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**WASTELOAD ANALYSIS [WLA]**  
**Addendum: Statement of Basis**  
**SUMMARY**

**Discharging Facility:** Genwal Resources Inc.

UPDES No: UT-0024368

Current Flow: 1.50 MGD Design Flow

Design Flow 1.50 MGD

**Receiving Water:** Crandall Creek -> Huntington Creek

Stream Classification: 1C, 2B, 3A, 4

Stream Flows [cfs]: 0.33 Summer (July-Sept) 20th Percentile

0.33 Fall (Oct-Dec) 20th Percentile

0.33 Winter (Jan-Mar) 20th Percentile

0.33 Spring (Apr-June) 20th Percentile

1.6 Average

Stream TDS Values: 572.0 Summer (July-Sept) Average

572.0 Fall (Oct-Dec) Average

572.0 Winter (Jan-Mar) Average

572.0 Spring (Apr-June) Average

**Effluent Limits:**

**WQ Standard:**

Flow, MGD: 1.50 MGD Design Flow

BOD, mg/l: 25.0 Summer 5.0 Indicator

Dissolved Oxygen, mg/l: 5.5 Summer 6.5 30 Day Average

TNH3, Chronic, mg/l: 3.6 Summer Varies Function of pH and Temperature

TDS, mg/l: 1289.3 Summer 1200.0

**Modeling Parameters:**

Acute River Width: 50.0%

Chronic River Width: 100.0%

**Level 1 Antidegradation Level Completed: Level II Review required; Class 1C drinking water source.**

Date: 2/26/2016

Permit Writer:

WLA by:

WQM Sec. Approval:

TMDL Sec. Approval:

*Paul M. Weber*

3-1-16

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**WASTELOAD ANALYSIS [WLA]  
Addendum: Statement of Basis**

<b>26-Feb-16</b>
<b>4:00 PM</b>

**Facilities:** Genwal Resources Inc.  
**Discharging to:** Crandall Creek -> Huntington Creek

**UPDES No: UT-0024368**

**I. Introduction**

Wasteload analyses are performed to determine point source effluent limitations necessary to maintain designated beneficial uses by evaluating projected effects of discharge concentrations on in-stream water quality. The wasteload analysis also takes into account downstream designated uses [R317-2-8, UAC]. Projected concentrations are compared to numeric water quality standards to determine acceptability. The anti-degradation policy and procedures are also considered. The primary in-stream parameters of concern may include metals (as a function of hardness), total dissolved solids (TDS), total residual chlorine (TRC), un-ionized ammonia (as a function of pH and temperature, measured and evaluated in terms of total ammonia), and dissolved oxygen.

Mathematical water quality modeling is employed to determine stream quality response to point source discharges. Models aid in the effort of anticipating stream quality at future effluent flows at critical environmental conditions (e.g., low stream flow, high temperature, high pH, etc).

The numeric criteria in this wasteload analysis may always be modified by narrative criteria and other conditions determined by staff of the Division of Water Quality.

**II. Receiving Water and Stream Classification**

Crandall Creek -> Huntington Creek: 1C, 2B, 3A, 4  
Antidegradation Review: Level I review completed. Level II review required.

**III. Numeric Stream Standards for Protection of Aquatic Wildlife**

Total Ammonia (TNH3)	Varies as a function of Temperature and pH Rebound. See Water Quality Standards
Chronic Total Residual Chlorine (TRC)	0.011 mg/l (4 Day Average) 0.019 mg/l (1 Hour Average)
Chronic Dissolved Oxygen (DO)	6.50 mg/l (30 Day Average) 5.00 mg/l (7Day Average) 4.00 mg/l (1 Day Average)
Maximum Total Dissolved Solids	1200.0 mg/l

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**Acute and Chronic Heavy Metals (Dissolved)**

Parameter	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard		
	Concentration	Load*	Concentration		Load*
Aluminum	87.00 ug/l**	1.090 lbs/day	750.00	ug/l	9.399 lbs/day
Arsenic	190.00 ug/l	2.381 lbs/day	340.00	ug/l	4.261 lbs/day
Cadmium	0.76 ug/l	0.010 lbs/day	8.85	ug/l	0.111 lbs/day
Chromium III	271.16 ug/l	3.398 lbs/day	5673.11	ug/l	71.094 lbs/day
Chromium VI	11.00 ug/l	0.138 lbs/day	16.00	ug/l	0.201 lbs/day
Copper	30.85 ug/l	0.387 lbs/day	52.34	ug/l	0.656 lbs/day
Iron			1000.00	ug/l	12.532 lbs/day
Lead	18.90 ug/l	0.237 lbs/day	484.95	ug/l	6.077 lbs/day
Mercury	0.0120 ug/l	0.000 lbs/day	2.40	ug/l	0.030 lbs/day
Nickel	170.45 ug/l	2.136 lbs/day	1533.06	ug/l	19.212 lbs/day
Selenium	4.60 ug/l	0.058 lbs/day	20.00	ug/l	0.251 lbs/day
Silver	N/A ug/l	N/A lbs/day	42.02	ug/l	0.527 lbs/day
Zinc	392.22 ug/l	4.915 lbs/day	392.22	ug/l	4.915 lbs/day

\* Allowed below discharge

\*\*Chronic Aluminum standard applies only to waters with a pH < 7.0 and a Hardness < 50 mg/l as CaCO<sub>3</sub>

Metals Standards Based upon a Hardness of 405.35 mg/l as CaCO<sub>3</sub>

**Organics [Pesticides]**

Parameter	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard		
	Concentration	Load*	Concentration		Load*
Aldrin			1.500	ug/l	0.019 lbs/day
Chlordane	0.004 ug/l	0.061 lbs/day	1.200	ug/l	0.015 lbs/day
DDT, DDE	0.001 ug/l	0.014 lbs/day	0.550	ug/l	0.007 lbs/day
Dieldrin	0.002 ug/l	0.027 lbs/day	1.250	ug/l	0.016 lbs/day
Endosulfan	0.056 ug/l	0.800 lbs/day	0.110	ug/l	0.001 lbs/day
Endrin	0.002 ug/l	0.033 lbs/day	0.090	ug/l	0.001 lbs/day
Guthion			0.010	ug/l	0.000 lbs/day
Heptachlor	0.004 ug/l	0.054 lbs/day	0.260	ug/l	0.003 lbs/day
Lindane	0.080 ug/l	1.143 lbs/day	1.000	ug/l	0.013 lbs/day
Methoxychlor			0.030	ug/l	0.000 lbs/day
Mirex			0.010	ug/l	0.000 lbs/day
Parathion			0.040	ug/l	0.001 lbs/day
PCB's	0.014 ug/l	0.200 lbs/day	2.000	ug/l	0.025 lbs/day
Pentachlorophenol	13.00 ug/l	185.721 lbs/day	20.000	ug/l	0.251 lbs/day
Toxephene	0.0002 ug/l	0.003 lbs/day	0.7300	ug/l	0.009 lbs/day

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**IV. Numeric Stream Standards for Protection of Agriculture**

	<b>4 Day Average (Chronic) Standard</b>		<b>1 Hour Average (Acute) Standard</b>	
	<b>Concentration</b>	<b>Load*</b>	<b>Concentration</b>	<b>Load*</b>
Arsenic			100.0 ug/l	lbs/day
Boron			750.0 ug/l	4.70 lbs/day
Cadmium			10.0 ug/l	0.06 lbs/day
Chromium			100.0 ug/l	lbs/day
Copper			200.0 ug/l	lbs/day
Lead			100.0 ug/l	lbs/day
Selenium			50.0 ug/l	lbs/day
TDS, Summer			1200.0 mg/l	7.52 tons/day

**V. Numeric Stream Standards for Protection of Human Health (Class 1C Waters)**

<b>Metals</b>	<b>4 Day Average (Chronic) Standard</b>		<b>1 Hour Average (Acute) Standard</b>	
	<b>Concentration</b>	<b>Load*</b>	<b>Concentration</b>	<b>Load*</b>
Arsenic			50.0 ug/l	0.714 lbs/day
Barium			1000.0 ug/l	14.286 lbs/day
Cadmium			10.0 ug/l	0.143 lbs/day
Chromium			50.0 ug/l	0.714 lbs/day
Lead			50.0 ug/l	0.714 lbs/day
Mercury			2.0 ug/l	0.029 lbs/day
Selenium			10.0 ug/l	0.143 lbs/day
Silver			50.0 ug/l	0.714 lbs/day
Fluoride (3)			1.4 ug/l	0.020 lbs/day
to			2.4 ug/l	0.034 lbs/day
Nitrates as N			10.0 ug/l	0.143 lbs/day

**Chlorophenoxy Herbicides**

2,4-D	100.0 ug/l	1.429 lbs/day
2,4,5-TP	10.0 ug/l	0.143 lbs/day
Endrin	0.2 ug/l	0.003 lbs/day
ocyclohexane (Lindane)	4.0 ug/l	0.057 lbs/day
Methoxychlor	100.0 ug/l	1.429 lbs/day
Toxaphene	5.0 ug/l	0.071 lbs/day

**VI. Numeric Stream Standards the Protection of Human Health from Water & Fish Consumption [Toxics]**

	<b>Maximum Conc., ug/l - Acute Standards</b>			
	<b>Class 1C</b>		<b>Class 3A, 3B</b>	
<b>Toxic Organics</b>	<b>[2 Liters/Day for 70 Kg Person over 70 Yr.]</b>		<b>[6.5 g for 70 Kg Person over 70 Yr.]</b>	
Acenaphthene	1200.00 ug/l	17.14 lbs/day	2700.0 ug/l	38.57 lbs/day
Acrolein	320.00 ug/l	4.57 lbs/day	780.0 ug/l	11.14 lbs/day
Acrylonitrile	0.06 ug/l	0.00 lbs/day	0.7 ug/l	0.01 lbs/day
Benzene	1.20 ug/l	0.02 lbs/day	71.0 ug/l	1.01 lbs/day
Benzidine	0.00012 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Carbon tetrachloride	0.25 ug/l	0.00 lbs/day	4.4 ug/l	0.06 lbs/day
Chlorobenzene	680.00 ug/l	9.71 lbs/day	21000.0 ug/l	300.01 lbs/day
1,2,4-Trichlorobenzene				
Hexachlorobenzene	0.00075 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
1,2-Dichloroethane	0.38 ug/l	0.01 lbs/day	99.0 ug/l	1.41 lbs/day

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1,1,1-Trichloroethane				
Hexachloroethane	1.90 ug/l	0.03 lbs/day	8.9 ug/l	0.13 lbs/day
1,1-Dichloroethane				
1,1,2-Trichloroethane	0.61 ug/l	0.01 lbs/day	42.0 ug/l	0.60 lbs/day
1,1,2,2-Tetrachloroethane	0.17 ug/l	0.00 lbs/day	11.0 ug/l	0.16 lbs/day
Chloroethane			0.0 ug/l	0.00 lbs/day
Bis(2-chloroethyl) ether	0.03 ug/l	0.00 lbs/day	1.4 ug/l	0.02 lbs/day
2-Chloroethyl vinyl ether	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
2-Chloronaphthalene	1700.00 ug/l	24.29 lbs/day	4300.0 ug/l	61.43 lbs/day
2,4,6-Trichlorophenol	2.10 ug/l	0.03 lbs/day	6.5 ug/l	0.09 lbs/day
p-Chloro-m-cresol			0.0 ug/l	0.00 lbs/day
Chloroform (HM)	5.70 ug/l	0.08 lbs/day	470.0 ug/l	6.71 lbs/day
2-Chlorophenol	120.00 ug/l	1.71 lbs/day	400.0 ug/l	5.71 lbs/day
1,2-Dichlorobenzene	2700.00 ug/l	38.57 lbs/day	17000.0 ug/l	242.87 lbs/day
1,3-Dichlorobenzene	400.00 ug/l	5.71 lbs/day	2600.0 ug/l	37.14 lbs/day
1,4-Dichlorobenzene	400.00 ug/l	5.71 lbs/day	2600.0 ug/l	37.14 lbs/day
3,3'-Dichlorobenzidine	0.04 ug/l	0.00 lbs/day	0.1 ug/l	0.00 lbs/day
1,1-Dichloroethylene	0.06 ug/l	0.00 lbs/day	3.2 ug/l	0.05 lbs/day
1,2-trans-Dichloroethylene	700.00 ug/l	10.00 lbs/day	0.0 ug/l	0.00 lbs/day
2,4-Dichlorophenol	93.00 ug/l	1.33 lbs/day	790.0 ug/l	11.29 lbs/day
1,2-Dichloropropane	0.52 ug/l	0.01 lbs/day	39.0 ug/l	0.56 lbs/day
1,3-Dichloropropylene	10.00 ug/l	0.14 lbs/day	1700.0 ug/l	24.29 lbs/day
2,4-Dimethylphenol	540.00 ug/l	7.71 lbs/day	2300.0 ug/l	32.86 lbs/day
2,4-Dinitrotoluene	0.11 ug/l	0.00 lbs/day	9.1 ug/l	0.13 lbs/day
2,6-Dinitrotoluene	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
1,2-Diphenylhydrazine	0.04 ug/l	0.00 lbs/day	0.5 ug/l	0.01 lbs/day
Ethylbenzene	3100.00 ug/l	44.29 lbs/day	29000.0 ug/l	414.30 lbs/day
Fluoranthene	300.00 ug/l	4.29 lbs/day	370.0 ug/l	5.29 lbs/day
4-Chlorophenyl phenyl ether				
4-Bromophenyl phenyl ether				
Bis(2-chloroisopropyl) ether	1400.00 ug/l	20.00 lbs/day	170000.0 ug/l	2428.65 lbs/day
Bis(2-chloroethoxy) methane	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Methylene chloride (HM)	4.70 ug/l	0.07 lbs/day	1600.0 ug/l	22.86 lbs/day
Methyl chloride (HM)	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Methyl bromide (HM)	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Bromoform (HM)	4.30 ug/l	0.06 lbs/day	360.0 ug/l	5.14 lbs/day
Dichlorobromomethane	0.27 ug/l	0.00 lbs/day	22.0 ug/l	0.31 lbs/day
Chlorodibromomethane	0.41 ug/l	0.01 lbs/day	34.0 ug/l	0.49 lbs/day
Hexachlorobutadiene(c)	0.44 ug/l	0.01 lbs/day	50.0 ug/l	0.71 lbs/day
Hexachlorocyclopentadiene	240.00 ug/l	3.43 lbs/day	17000.0 ug/l	242.87 lbs/day
Isophorone	8.40 ug/l	0.12 lbs/day	600.0 ug/l	8.57 lbs/day
Naphthalene				
Nitrobenzene	17.00 ug/l	0.24 lbs/day	1900.0 ug/l	27.14 lbs/day
2-Nitrophenol	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
4-Nitrophenol	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
2,4-Dinitrophenol	70.00 ug/l	1.00 lbs/day	14000.0 ug/l	200.01 lbs/day
4,6-Dinitro-o-cresol	13.00 ug/l	0.19 lbs/day	765.0 ug/l	10.93 lbs/day
N-Nitrosodimethylamine	0.00069 ug/l	0.00 lbs/day	8.1 ug/l	0.12 lbs/day
N-Nitrosodiphenylamine	5.00 ug/l	0.07 lbs/day	16.0 ug/l	0.23 lbs/day
N-Nitrosodi-n-propylamine	0.01 ug/l	0.00 lbs/day	1.4 ug/l	0.02 lbs/day
Pentachlorophenol	0.28 ug/l	0.00 lbs/day	8.2 ug/l	0.12 lbs/day



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Phenol	2.10E+04 ug/l	3.00E+02 lbs/day	4.6E+06 ug/l	6.57E+04 lbs/day
Bis(2-ethylhexyl)phthala	1.80 ug/l	0.03 lbs/day	5.9 ug/l	0.08 lbs/day
Butyl benzyl phthalate	3000.00 ug/l	42.86 lbs/day	5200.0 ug/l	74.29 lbs/day
Di-n-butyl phthalate	2700.00 ug/l	38.57 lbs/day	12000.0 ug/l	171.43 lbs/day
Di-n-octyl phthlate				
Diethyl phthalate	23000.00 ug/l	328.58 lbs/day	120000.0 ug/l	1714.34 lbs/day
Dimethyl phthlate	3.13E+05 ug/l	4.47E+03 lbs/day	2.9E+06 ug/l	4.14E+04 lbs/day
Benzo(a)anthracene (P/	0.0028 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Benzo(a)pyrene (PAH)	0.0028 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Benzo(b)fluoranthene (F	0.0028 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Benzo(k)fluoranthene (F	0.0028 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Chrysene (PAH)	0.0028 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Acenaphthylene (PAH)				
Anthracene (PAH)	9600.00 ug/l	137.15 lbs/day	0.0 ug/l	0.00 lbs/day
Dibenzo(a,h)anthracene	0.0028 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Indeno(1,2,3-cd)pyrene	0.0028 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Pyrene (PAH)	960.00 ug/l	13.71 lbs/day	11000.0 ug/l	157.15 lbs/day
Tetrachloroethylene	0.80 ug/l	0.01 lbs/day	8.9 ug/l	0.13 lbs/day
Toluene	6800.00 ug/l	97.15 lbs/day	200000 ug/l	2857.24 lbs/day
Trichloroethylene	2.70 ug/l	0.04 lbs/day	81.0 ug/l	1.16 lbs/day
Vinyl chloride	2.00 ug/l	0.03 lbs/day	525.0 ug/l	7.50 lbs/day
			0.0	0.00 lbs/day
<b>Pesticides</b>			0.0	0.00 lbs/day
Aldrin	0.0001 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Dieldrin	0.0001 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Chlordane	0.0006 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
4,4'-DDT	0.0006 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
4,4'-DDE	0.0006 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
4,4'-DDD	0.0008 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
alpha-Endosulfan	0.9300 ug/l	0.01 lbs/day	2.0 ug/l	0.03 lbs/day
beta-Endosulfan	0.9300 ug/l	0.01 lbs/day	2.0 ug/l	0.03 lbs/day
Endosulfan sulfate	0.9300 ug/l	0.01 lbs/day	2.0 ug/l	0.03 lbs/day
Endrin	0.7600 ug/l	0.01 lbs/day	0.8 ug/l	0.01 lbs/day
Endrin aldehyde	0.7600 ug/l	0.01 lbs/day	0.8 ug/l	0.01 lbs/day
Heptachlor	0.0002 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Heptachlor epoxide				
<b>PCB's</b>				
PCB 1242 (Arochlor 124	0.000044 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1254 (Arochlor 124	0.000044 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1221 (Arochlor 124	0.000044 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1232 (Arochlor 124	0.000044 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1248 (Arochlor 124	0.000044 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1260 (Arochlor 124	0.000044 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1016 (Arochlor 10	0.000044 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
<b>Pesticide</b>				
Toxaphene	0.000750 ug/l	0.00	0.0 ug/l	0.00 lbs/day
<b>Dioxin</b>				
Dioxin (2,3,7,8-TCDD)	1.30E-08 ug/l	0.00 lbs/day	1.40E-08	0.00

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**Metals**

Antimony	14.0 ug/l	0.20 lbs/day		
Arsenic	50.0 ug/l	0.71 lbs/day	4300.00 ug/l	61.43 lbs/day
Asbestos	7.00E+06 ug/l	1.00E+05 lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	1.30E+03 ug/l	18.57 lbs/day	2.2E+05 ug/l	3142.96 lbs/day
Lead	700.0 ug/l	10.00 lbs/day		
Mercury			0.15 ug/l	0.00 lbs/day
Nickel			4600.00 ug/l	65.72 lbs/day
Selenium	0.1 ug/l	0.00 lbs/day		
Silver	610.0 ug/l	8.71 lbs/day		
Thallium			6.30 ug/l	0.09 lbs/day
Zinc				

**There are additional standards that apply to this receiving water, but were not considered in this modeling/waste load allocation analysis.**

## **VII. Mathematical Modeling of Stream Quality**

Model configuration was accomplished utilizing standard modeling procedures. Data points were plotted and coefficients adjusted as required to match observed data as closely as possible.

The modeling approach used in this analysis included one or a combination of the following models.

(1) The Utah River Model, Utah Division of Water Quality, 1992. Based upon STREAMDO IV (Region VIII) and Supplemental Ammonia Toxicity Models; EPA Region VIII, Sept. 1990 and QUAL2E (EPA, Athens, GA).

(2) Utah Ammonia/Chlorine Model, Utah Division of Water Quality, 1992.

(3) AMMTOX Model, University of Colorado, Center of Limnology, and EPA Region 8

(4) Principles of Surface Water Quality Modeling and Control. Robert V. Thomann, et.al. Harper Collins Publisher, Inc. 1987, pp. 644.

Coefficients used in the model were based, in part, upon the following references:

(1) Rates, Constants, and Kinetics Formulations in Surface Water Quality Modeling. Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens Georgia. EPA/600/3-85/040 June 1985.

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(2) Principles of Surface Water Quality Modeling and Control. Robert V. Thomann, et.al.  
Harper Collins Publisher, Inc. 1987, pp. 644.

### VIII. Modeling Information

The required information for the model may include the following information for both the upstream conditions at low flow and the effluent conditions:

Flow, Q, (cfs or MGD)	D.O. mg/l
Temperature, Deg. C.	Total Residual Chlorine (TRC), mg/l
pH	Total NH3-N, mg/l
BOD5, mg/l	Total Dissolved Solids (TDS), mg/l
Metals, ug/l	Toxic Organics of Concern, ug/l

### Other Conditions

In addition to the upstream and effluent conditions, the models require a variety of physical and biological coefficients and other technical information. In the process of actually establishing the permit limits for an effluent, values are used based upon the available data, model calibration, literature values, site visits and best professional judgement.

### Model Inputs

The following is upstream and discharge information that was utilized as inputs for the analysis. Dry washes are considered to have an upstream flow equal to the flow of the discharge.

### Current Upstream Information

	Stream		pH	T-NH3 mg/l as N	BOD5 mg/l	DO mg/l	TRC mg/l	TDS mg/l
	Flow cfs	Temp. Deg. C						
Critical Low								
Summer (Irrig. Season)	0.3	5.0	8.4	0.01	0.50	8.52	0.00	572.0
Fall	0.3	5.0	8.4	0.01	0.50	---	0.00	572.0
Winter	0.3	5.0	8.4	0.01	0.50	---	0.00	572.0
Spring	0.3	5.0	8.4	0.01	0.50	---	0.00	572.0
Dissolved Metals	Al ug/l	As ug/l	Cd ug/l	CrIII ug/l	CrVI ug/l	Copper ug/l	Fe ug/l	Pb ug/l
All Seasons	1.59*	0.53*	0.053*	0.53*	2.65*	0.53*	0.83*	0.53*
Dissolved Metals	Hg ug/l	Ni ug/l	Se ug/l	Ag ug/l	Zn ug/l	Boron ug/l		
All Seasons	0.0000	0.53*	1.06*	0.1*	0.053*	10.0		

\* 1/2 MDL

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**Projected Discharge Information**

Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	1.50000	11.9	622.00	3.88983
Fall	1.50000	11.9		
Winter	1.50000	11.9		
Spring	1.50000	11.9		

All model numerical inputs, intermediate calculations, outputs and graphs are available for discussion, inspection and copy at the Division of Water Quality.

**IX. Effluent Limitations**

Current State water quality standards are required to be met under a variety of conditions including in-stream flows targeted to the 7-day, 10-year low flow (R317-2-9).

Other conditions used in the modeling effort coincide with the environmental conditions expected at low stream flows.

**Effluent Limitation for Flow based upon Water Quality Standards**

In-stream criteria of downstream segments will be met with an effluent flow maximum value as follows:

Season	Daily Average	
Summer	1.500 MGD	2.321 cfs
Fall	1.500 MGD	2.321 cfs
Winter	1.500 MGD	2.321 cfs
Spring	1.500 MGD	2.321 cfs

**Flow Requirement or Loading Requirement**

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 1.5 MGD. If the discharger is allowed to have a flow greater than 1.5 MGD during 7Q10 conditions, and effluent limit concentrations as indicated, then water quality standards will be violated. In order to prevent this from occurring, the permit writers must include the discharge flow limitation as indicated above; or, include loading effluent limits in the permit.

**Effluent Limitation for Whole Effluent Toxicity (WET) based upon WET Policy**

Effluent Toxicity will not occur in downstream segments if the values below are met.

WET Requirements	LC50 >	EOP Effluent	[Acute]
	IC25 >	87.5% Effluent	[Chronic]

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**Effluent Limitation for Biological Oxygen Demand (BOD) based upon Water Quality Standards or Regulations**

In-stream criteria of downstream segments for Dissolved Oxygen will be met with an effluent BOD limitation as follows:

Season	Concentration	
Summer	25.0 mg/l as BOD5	312.7 lbs/day
Fall	25.0 mg/l as BOD5	312.7 lbs/day
Winter	25.0 mg/l as BOD5	312.7 lbs/day
Spring	25.0 mg/l as BOD5	312.7 lbs/day

**Effluent Limitation for Dissolved Oxygen (DO) based upon Water Quality Standards**

In-stream criteria of downstream segments for Dissolved Oxygen will be met with an effluent D.O. limitation as follows:

Season	Concentration
Summer	5.50
Fall	5.50
Winter	5.50
Spring	5.50

**Effluent Limitation for Total Ammonia based upon Water Quality Standards**

In-stream criteria of downstream segments for Total Ammonia will be met with an effluent limitation (expressed as Total Ammonia as N) as follows:

Season		Concentration	Load
Summer	4 Day Avg. - Chronic	3.6 mg/l as N	45.4 lbs/day
	1 Hour Avg. - Acute	8.1 mg/l as N	101.2 lbs/day
Fall	4 Day Avg. - Chronic	3.6 mg/l as N	45.4 lbs/day
	1 Hour Avg. - Acute	8.4 mg/l as N	105.6 lbs/day
Winter	4 Day Avg. - Chronic	3.6 mg/l as N	45.4 lbs/day
	1 Hour Avg. - Acute	8.7 mg/l as N	108.8 lbs/day
Spring	4 Day Avg. - Chronic	3.6 mg/l as N	45.4 lbs/day
	1 Hour Avg. - Acute	8.4 mg/l as N	105.6 lbs/day

Acute limit calculated with an Acute Zone of Initial Dilution (ZID) to be equal to 100. %.

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**Effluent Limitation for Total Residual Chlorine based upon Water Quality Standards**

In-stream criteria of downstream segments for Total Residual Chlorine will be met with an effluent limitation as follows:

Season		Concentration		Load	
Summer	4 Day Avg. - Chronic	0.012	mg/l	0.16	lbs/day
	1 Hour Avg. - Acute	0.022	mg/l	0.27	lbs/day
Fall	4 Day Avg. - Chronic	0.012	mg/l	0.16	lbs/day
	1 Hour Avg. - Acute	0.022	mg/l	0.27	lbs/day
Winter	4 Day Avg. - Chronic	0.012	mg/l	0.16	lbs/day
	1 Hour Avg. - Acute	0.022	mg/l	0.27	lbs/day
Spring	4 Day Avg. - Chronic	0.012	mg/l	0.00	lbs/day
	1 Hour Avg. - Acute	0.022	mg/l	0.00	lbs/day

**Effluent Limitations for Total Dissolved Solids based upon Water Quality Standards**

Season		Concentration		Load	
Summer	Maximum, Acute	1289.3	mg/l	8.06	tons/day
Fall	Maximum, Acute	1289.3	mg/l	8.06	tons/day
Winter	Maximum, Acute	1289.3	mg/l	8.06	tons/day
Spring	4 Day Avg. - Chronic	1289.3	mg/l	8.06	tons/day

Colorado Salinity Forum Limits      Determined by Permitting Section

**Effluent Limitations for Total Recoverable Metals based upon Water Quality Standards**

In-stream criteria of downstream segments for Dissolved Metals will be met with an effluent limitation as follows (based upon a hardness of 405.35 mg/l):

	4 Day Average		Load	1 Hour Average		Load
	Concentration			Concentration		
Aluminum*	N/A		N/A	856.3	ug/l	10.7 lbs/day
Arsenic*	216.91	ug/l	1.8 lbs/day	388.2	ug/l	4.9 lbs/day
Cadmium	0.86	ug/l	0.0 lbs/day	10.1	ug/l	0.1 lbs/day
Chromium III	309.60	ug/l	2.5 lbs/day	6,479.8	ug/l	81.2 lbs/day
Chromium VI*	12.00	ug/l	0.1 lbs/day	17.7	ug/l	0.2 lbs/day
Copper	35.12	ug/l	0.3 lbs/day	59.7	ug/l	0.7 lbs/day
Iron*	N/A		N/A	1,142.0	ug/l	14.3 lbs/day
Lead	21.47	ug/l	0.2 lbs/day	553.8	ug/l	6.9 lbs/day
Mercury*	0.01	ug/l	0.0 lbs/day	2.7	ug/l	0.0 lbs/day
Nickel	194.57	ug/l	1.6 lbs/day	1,751.0	ug/l	21.9 lbs/day
Selenium*	5.03	ug/l	0.0 lbs/day	22.6	ug/l	0.3 lbs/day
Silver	N/A	ug/l	N/A lbs/day	48.0	ug/l	0.6 lbs/day

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Zinc	447.99 ug/l	3.6 lbs/day	448.0	ug/l	5.6 lbs/day
Cyanide*	5.94 ug/l	0.0 lbs/day	25.1	ug/l	0.3 lbs/day

\*Limits for these metals are based on the dissolved standard.

**Effluent Limitations for Heat/Temperature based upon  
Water Quality Standards**

Summer	7.3 Deg. C.	45.1 Deg. F
Fall	7.3 Deg. C.	45.1 Deg. F
Winter	7.3 Deg. C.	45.1 Deg. F
Spring	7.3 Deg. C.	45.1 Deg. F

**Effluent Limitations for Organics [Pesticides]  
Based upon Water Quality Standards**

In-stream criteria of downstream segments for Organics [Pesticides]  
will be met with an effluent limit as follows:

	4 Day Average		1 Hour Average		
	Concentration	Load	Concentration	Load	
Aldrin			1.5E+00	ug/l	2.91E-02 lbs/day
Chlordane	4.30E-03 ug/l	5.38E-02 lbs/day	1.2E+00	ug/l	2.33E-02 lbs/day
DDT, DDE	1.00E-03 ug/l	1.25E-02 lbs/day	5.5E-01	ug/l	1.07E-02 lbs/day
Dieldrin	1.90E-03 ug/l	2.38E-02 lbs/day	1.3E+00	ug/l	2.42E-02 lbs/day
Endosulfan	5.60E-02 ug/l	7.00E-01 lbs/day	1.1E-01	ug/l	2.13E-03 lbs/day
Endrin	2.30E-03 ug/l	2.88E-02 lbs/day	9.0E-02	ug/l	1.74E-03 lbs/day
Guthion	0.00E+00 ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	1.94E-04 lbs/day
Heptachlor	3.80E-03 ug/l	4.75E-02 lbs/day	2.6E-01	ug/l	5.04E-03 lbs/day
Lindane	8.00E-02 ug/l	1.00E+00 lbs/day	1.0E+00	ug/l	1.94E-02 lbs/day
Methoxychlor	0.00E+00 ug/l	0.00E+00 lbs/day	3.0E-02	ug/l	5.82E-04 lbs/day
Mirex	0.00E+00 ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	1.94E-04 lbs/day
Parathion	0.00E+00 ug/l	0.00E+00 lbs/day	4.0E-02	ug/l	7.75E-04 lbs/day
PCB's	1.40E-02 ug/l	1.75E-01 lbs/day	2.0E+00	ug/l	3.88E-02 lbs/day
Pentachlorophenol	1.30E+01 ug/l	1.63E+02 lbs/day	2.0E+01	ug/l	3.88E-01 lbs/day
Toxephene	2.00E-04 ug/l	2.50E-03 lbs/day	7.3E-01	ug/l	1.42E-02 lbs/day

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**Effluent Targets for Pollution Indicators  
Based upon Water Quality Standards**

In-stream criteria of downstream segments for Pollution Indicators will be met with an effluent limit as follows:

	<b>1 Hour Average</b>	
	<b>Concentration</b>	<b>Loading</b>
Gross Beta (pCi/l)	50.0 pCi/L	
BOD (mg/l)	5.0 mg/l	62.7 lbs/day
Nitrates as N	4.0 mg/l	50.1 lbs/day
Total Phosphorus as P	0.05 mg/l	0.6 lbs/day
Total Suspended Solids	90.0 mg/l	1127.9 lbs/day

Note: Pollution indicator targets are for information purposes only.

**Effluent Limitations for Protection of Human Health [Toxics Rule]  
Based upon Water Quality Standards (Most stringent of 1C or 3A & 3B as appropriate.)**

In-stream criteria of downstream segments for Protection of Human Health [Toxics] will be met with an effluent limit as follows:

	<b>Maximum Concentration</b>	
	<b>Concentration</b>	<b>Load</b>
<b>Toxic Organics</b>		
Acenaphthene	1.37E+03 ug/l	1.71E+01 lbs/day
Acrolein	3.66E+02 ug/l	4.57E+00 lbs/day
Acrylonitrile	6.74E-02 ug/l	8.43E-04 lbs/day
Benzene	1.37E+00 ug/l	1.71E-02 lbs/day
Benzidine	ug/l	lbs/day
Carbon tetrachloride	2.86E-01 ug/l	3.57E-03 lbs/day
Chlorobenzene	7.77E+02 ug/l	9.71E+00 lbs/day
1,2,4-Trichlorobenzene		
Hexachlorobenzene	8.57E-04 ug/l	1.07E-05 lbs/day
1,2-Dichloroethane	4.34E-01 ug/l	5.43E-03 lbs/day
1,1,1-Trichloroethane		
Hexachloroethane	2.17E+00 ug/l	2.71E-02 lbs/day
1,1-Dichloroethane		
1,1,2-Trichloroethane	6.97E-01 ug/l	8.71E-03 lbs/day
1,1,2,2-Tetrachloroethane	1.94E-01 ug/l	2.43E-03 lbs/day
Chloroethane		
Bis(2-chloroethyl) ether	3.54E-02 ug/l	4.43E-04 lbs/day
2-Chloroethyl vinyl ether		
2-Chloronaphthalene	1.94E+03 ug/l	2.43E+01 lbs/day
2,4,6-Trichlorophenol	2.40E+00 ug/l	3.00E-02 lbs/day
p-Chloro-m-cresol		
Chloroform (HM)	6.51E+00 ug/l	8.14E-02 lbs/day
2-Chlorophenol	1.37E+02 ug/l	1.71E+00 lbs/day
1,2-Dichlorobenzene	3.08E+03 ug/l	3.86E+01 lbs/day
1,3-Dichlorobenzene	4.57E+02 ug/l	5.71E+00 lbs/day



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1,4-Dichlorobenzene	4.57E+02 ug/l	5.71E+00 lbs/day
3,3'-Dichlorobenzidine	4.57E-02 ug/l	5.71E-04 lbs/day
1,1-Dichloroethylene	6.51E-02 ug/l	8.14E-04 lbs/day
1,2-trans-Dichloroethylene		
2,4-Dichlorophenol	1.06E+02 ug/l	1.33E+00 lbs/day
1,2-Dichloropropane	5.94E-01 ug/l	7.43E-03 lbs/day
1,3-Dichloropropylene	1.14E+01 ug/l	1.43E-01 lbs/day
2,4-Dimethylphenol	6.17E+02 ug/l	7.71E+00 lbs/day
2,4-Dinitrotoluene	1.26E-01 ug/l	1.57E-03 lbs/day
2,6-Dinitrotoluene		
1,2-Diphenylhydrazine	4.57E-02 ug/l	5.71E-04 lbs/day
Ethylbenzene	3.54E+03 ug/l	4.43E+01 lbs/day
Fluoranthene	3.43E+02 ug/l	4.29E+00 lbs/day
4-Chlorophenyl phenyl ether		
4-Bromophenyl phenyl ether		
Bis(2-chloroisopropyl) ether	1.60E+03 ug/l	2.00E+01 lbs/day
Bis(2-chloroethoxy) methane		
Methylene chloride (HM)	5.37E+00 ug/l	6.71E-02 lbs/day
Methyl chloride (HM)		
Methyl bromide (HM)		
Bromoform (HM)	4.91E+00 ug/l	6.14E-02 lbs/day
Dichlorobromomethane(HM)	3.08E-01 ug/l	3.86E-03 lbs/day
Chlorodibromomethane (HM)	4.68E-01 ug/l	5.86E-03 lbs/day
Hexachlorocyclopentadiene	2.74E+02 ug/l	3.43E+00 lbs/day
Isophorone	9.59E+00 ug/l	1.20E-01 lbs/day
Naphthalene		
Nitrobenzene	1.94E+01 ug/l	2.43E-01 lbs/day
2-Nitrophenol		
4-Nitrophenol		
2,4-Dinitrophenol	8.00E+01 ug/l	1.00E+00 lbs/day
4,6-Dinitro-o-cresol	1.48E+01 ug/l	1.86E-01 lbs/day
N-Nitrosodimethylamine	7.88E-04 ug/l	9.86E-06 lbs/day
N-Nitrosodiphenylamine	5.71E+00 ug/l	7.14E-02 lbs/day
N-Nitrosodi-n-propylamine	5.71E-03 ug/l	7.14E-05 lbs/day
Pentachlorophenol	3.20E-01 ug/l	4.00E-03 lbs/day
Phenol	2.40E+04 ug/l	3.00E+02 lbs/day
Bis(2-ethylhexyl)phthalate	2.06E+00 ug/l	2.57E-02 lbs/day
Butyl benzyl phthalate	3.43E+03 ug/l	4.29E+01 lbs/day
Di-n-butyl phthalate	3.08E+03 ug/l	3.86E+01 lbs/day
Di-n-octyl phthlate		
Diethyl phthalate	2.63E+04 ug/l	3.29E+02 lbs/day
Dimethyl phthlate	3.58E+05 ug/l	4.47E+03 lbs/day
Benzo(a)anthracene (PAH)	3.20E-03 ug/l	4.00E-05 lbs/day
Benzo(a)pyrene (PAH)	3.20E-03 ug/l	4.00E-05 lbs/day
Benzo(b)fluoranthene (PAH)	3.20E-03 ug/l	4.00E-05 lbs/day
Benzo(k)fluoranthene (PAH)	3.20E-03 ug/l	4.00E-05 lbs/day
Chrysene (PAH)	3.20E-03 ug/l	4.00E-05 lbs/day
Acenaphthylene (PAH)		
Anthracene (PAH)		
Dibenzo(a,h)anthracene (PAH)	3.20E-03 ug/l	4.00E-05 lbs/day
Indeno(1,2,3-cd)pyrene (PAH)	3.20E-03 ug/l	4.00E-05 lbs/day

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Pyrene (PAH)	1.10E+03 ug/l	1.37E+01 lbs/day
Tetrachloroethylene	9.14E-01 ug/l	1.14E-02 lbs/day
Toluene	7.77E+03 ug/l	9.71E+01 lbs/day
Trichloroethylene	3.08E+00 ug/l	3.86E-02 lbs/day
Vinyl chloride	2.28E+00 ug/l	2.86E-02 lbs/day

**Pesticides**

Aldrin	1.48E-04 ug/l	1.86E-06 lbs/day
Dieldrin	1.60E-04 ug/l	2.00E-06 lbs/day
Chlordane	6.51E-04 ug/l	8.14E-06 lbs/day
4,4'-DDT	6.74E-04 ug/l	8.43E-06 lbs/day
4,4'-DDE	6.74E-04 ug/l	8.43E-06 lbs/day
4,4'-DDD	9.48E-04 ug/l	1.19E-05 lbs/day
alpha-Endosulfan	1.06E+00 ug/l	1.33E-02 lbs/day
beta-Endosulfan	1.06E+00 ug/l	1.33E-02 lbs/day
Endosulfan sulfate	1.06E+00 ug/l	1.33E-02 lbs/day
Endrin	8.68E-01 ug/l	1.09E-02 lbs/day
Endrin aldehyde	8.68E-01 ug/l	1.09E-02 lbs/day
Heptachlor	2.40E-04 ug/l	3.00E-06 lbs/day
Heptachlor epoxide		

**PCB's**

PCB 1242 (Arochlor 1242)	5.03E-05 ug/l	6.29E-07 lbs/day
PCB-1254 (Arochlor 1254)	5.03E-05 ug/l	6.29E-07 lbs/day
PCB-1221 (Arochlor 1221)	5.03E-05 ug/l	6.29E-07 lbs/day
PCB-1232 (Arochlor 1232)	5.03E-05 ug/l	6.29E-07 lbs/day
PCB-1248 (Arochlor 1248)	5.03E-05 ug/l	6.29E-07 lbs/day
PCB-1260 (Arochlor 1260)	5.03E-05 ug/l	6.29E-07 lbs/day
PCB-1016 (Arochlor 1016)	5.03E-05 ug/l	6.29E-07 lbs/day

**Pesticide**

Toxaphene	8.34E-04 ug/l	1.04E-05 lbs/day
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**Metals**

Antimony	15.99 ug/l	0.20 lbs/day
Arsenic	57.00 ug/l	0.71 lbs/day
Asbestos	8.00E+06 ug/l	1.00E+05 lbs/day
Beryllium		
Cadmium		
Chromium (III)		
Chromium (VI)		
Copper	1484.87 ug/l	18.57 lbs/day
Cyanide	799.55 ug/l	10.00 lbs/day
Lead	0.00	0.00
Mercury	0.16 ug/l	0.00 lbs/day
Nickel	696.75 ug/l	8.71 lbs/day
Selenium	0.00	0.00
Silver	0.00	0.00
Thallium	1.94 ug/l	0.02 lbs/day
Zinc		

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**Dioxin**

Dioxin (2,3,7,8-TCDD)

1.48E-08 ug/l

1.86E-10 lbs/day

**Metals Effluent Limitations for Protection of All Beneficial Uses  
Based upon Water Quality Standards and Toxics Rule**

	<b>Class 4 Acute Agricultural ug/l</b>	<b>Class 3 Acute Aquatic Wildlife ug/l</b>	<b>Acute Toxics Drinking Water Source ug/l</b>	<b>Acute Toxics Wildlife ug/l</b>	<b>1C Acute Health Criteria ug/l</b>	<b>Acute Most Stringent ug/l</b>	<b>Class 3 Chronic Aquatic Wildlife ug/l</b>
Aluminum		856.3				856.3	N/A
Antimony			16.0	4911.5		16.0	
Arsenic	114.2	388.2	57.0		0.0	57.0	216.9
Barium					1142.2	1142.2	
Beryllium						0.0	
Cadmium	11.4	10.1			0.0	10.1	0.9
Chromium (III)		6479.8			0.0	6479.8	309.6
Chromium (VI)	114.1	17.7			0.0	17.71	12.00
Copper	228.3	59.7	1484.9			59.7	35.1
Cyanide		25.1	251286.4			25.1	5.9
Iron		1142.0				1142.0	
Lead	114.1	553.8			0.0	114.1	21.5
Mercury		2.74	0.2	0.17	0.0	0.16	0.014
Nickel		1751.0	696.7	5254.2		696.7	194.6
Selenium	56.9	22.6			0.0	22.6	5.0
Silver		48.0			0.0	48.0	
Thallium			1.9	7.2		1.9	
Zinc		448.0				448.0	448.0
Boron	856.7					856.7	

**Summary Effluent Limitations for Metals [Wasteload Allocation, TMDL]**

[If Acute is more stringent than Chronic, then the Chronic takes on the Acute value.]

	<b>WLA Acute ug/l</b>	<b>WLA Chronic ug/l</b>	
Aluminum	856.3	N/A	
Antimony	15.99		
Arsenic	57.0	216.9	Acute Controls
Asbestos	8.00E+06		
Barium			
Beryllium			
Cadmium	10.1	0.9	
Chromium (III)	6479.8	310	
Chromium (VI)	17.7	12.0	
Copper	59.7	35.1	

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Cyanide	25.1	5.9
Iron	1142.0	
Lead	114.1	21.5
Mercury	0.160	0.014
Nickel	696.7	195
Selenium	22.6	5.0
Silver	48.0	N/A
Thallium	1.9	
Zinc	448.0	448.0
Boron	856.66	

Other Effluent Limitations are based upon R317-1.

E. coli 126.0 organisms per 100 ml

#### **X. Antidegradation Considerations**

The Utah Antidegradation Policy allows for degradation of existing quality where it is determined that such lowering of water quality is necessary to accommodate important economic or social development in the area in which the waters are protected [R317-2-3]. It has been determined that certain chemical parameters introduced by this discharge will cause an increase of the concentration of said parameters in the receiving waters. Under no conditions will the increase in concentration be allowed to interfere with existing instream water uses.

The antidegradation rules and procedures allow for modification of effluent limits less than those based strictly upon mass balance equations utilizing 100% of the assimilative capacity of the receiving water. Additional factors include considerations for "Blue-ribbon" fisheries, special recreational areas, threatened and endangered species, and drinking water sources.

An Antidegradation Level I Review was conducted on this discharge and its effect on the receiving water. Based upon that review, it has been determined that an Antidegradation Level II Review is required.

#### **XI. Colorado River Salinity Forum Considerations**

Discharges in the Colorado River Basin are required to have their discharge at a TDS loading of less than 1.00 tons/day unless certain exemptions apply. Refer to the Forum's Guidelines for additional information allowing for an exceedence of this value.

#### **XII. Summary Comments**

The mathematical modeling and best professional judgement indicate that violations of receiving water beneficial uses with their associated water quality standards, including important down-stream segments, will not occur for the evaluated parameters of concern as discussed above if the effluent limitations indicated above are met.

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**XIII. Notice of UPDES Requirement**

This Addendum to the Statement of Basis does not authorize any entity or party to discharge to the waters of the State of Utah. That authority is granted through a UPDES permit issued by the Utah Division of Water Quality. The numbers presented here may be changed as a function of other factors. Dischargers are strongly urged to contact the Permits Section for further information. Permit writers may utilize other information to adjust these limits and/or to determine other limits based upon best available technology and other considerations provided that the values in this wasteload analysis [TMDL] are not compromised.

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File Name: Genwal Coal WLA 2-26-16.xls

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**APPENDIX - Coefficients and Other Model Information**

CBOD Coeff. (Kd)20 1/day 2.000	CBOD Coeff. FORCED (Kd)/day 0.000	CBOD Coeff. (Ka)T 1/day 1.004	REAER. Coeff. (Ka)20 (Ka)/day 96.072	REAER. Coeff. FORCED 1/day 0.000	REAER. Coeff. (Ka)T 1/day 67.313	NBOD Coeff. (Kn)20 1/day 0.250	NBOD Coeff. (Kn)T 1/day 0.079
Open Coeff. (K4)20 1/day 0.000	Open Coeff. (K4)T 1/day 0.000	NH3 LOSS (K5)20 1/day 4.000	NH3 (K5)T 1/day 2.008	NO2+NO3 LOSS (K6)20 1/day 0.000	NO2+NO3 (K6)T 1/day 0.000	TRC Decay K(CI)20 1/day 32.000	TRC K(CI)(T) 1/day 13.352
BENTHIC DEMAND (SOD)20 gm/m2/day 1.000	BENTHIC DEMAND (SOD)T gm/m2/day 0.389						
K1 CBOD {theta} 1.0	K2 Reaer. {theta} 1.0	K3 NH3 {theta} 1.1	K4 Open {theta} 1.0	K5 NH3 Loss {theta} 1.0	K6 NO2+3 {theta} 1.0	K(CI) TRC {theta} 1.1	S Benthic {theta} 1.1

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**Antidegradation Review**

**An antidegradation review (ADR) was conducted to determine whether the proposed activity complies with the applicable antidegradation requirements for receiving waters that may be affected. The Level I ADR evaluated the criteria of R317-2-3.5(b) and determined that the proposed discharge will require a Level II Antidegradation Review.**

